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Clean Secure Reliable Power

Enabling Smarter Energy Management for Fast Charging EV Stations

Executive Summary

A major operator of public fast EV charging stations aims to establish a state-of-the-art charging facility featuring **23 EV chargers,** supported by distributed energy resources (DERs) and battery storage. The objective is to minimize reliance on the grid, reduce operating costs, and provide a seamless fast charging experience for EV owners. DG Matrix has developed a customized energy management solution[1] centered around its innovative Power Routers to achieve an IRR of more than **30%** with a payback period of **4 years.**

Challenges

The operator faces significant challenges in designing and deploying this flagship public fast EV charging facility:

- **High Energy Demand:** Rapidly fast charging 23 vehicles simultaneously creates substantial peak loads, leading to elevated demand charges and increased stress on the local grid infrastructure.
- **Grid Dependency:** Relying on the grid for peak energy requirements increases exposure to potential disruptions and higher electricity prices.
- **Scalability Constraints:** Expanding the number of fast chargers and integrating additional renewable energy sources require costly infrastructure upgrades.
- **Sustainability Commitments:** The operator must align with environmental, social, and governance (ESG) goals by incorporating renewable energy solutions.
- **Deployment Timelines:** Rapid commissioning is critical to meeting market demand and operational deadlines.

Requirements and Priorities

The EV charging operator outlines the following priorities to address these challenges:

- **Cost Optimization:** Minimizes both capital expenditures (CapEx) and operational expenditures (OpEx) while maintaining profitability.
- **Resiliency:** Ensures uninterrupted fast charging services for EV owners, even during grid outages.
- **Sustainability:** Maximizes renewable energy usage and reduces carbon emissions.
- **Scalability:** Future-proofs the facility for easy integration of additional fast chargers and energy sources.
- **Operational Simplicity:** Implements a centralized energy management platform for seamless operation and monitoring.

[1] Project has not yet been deployed yet

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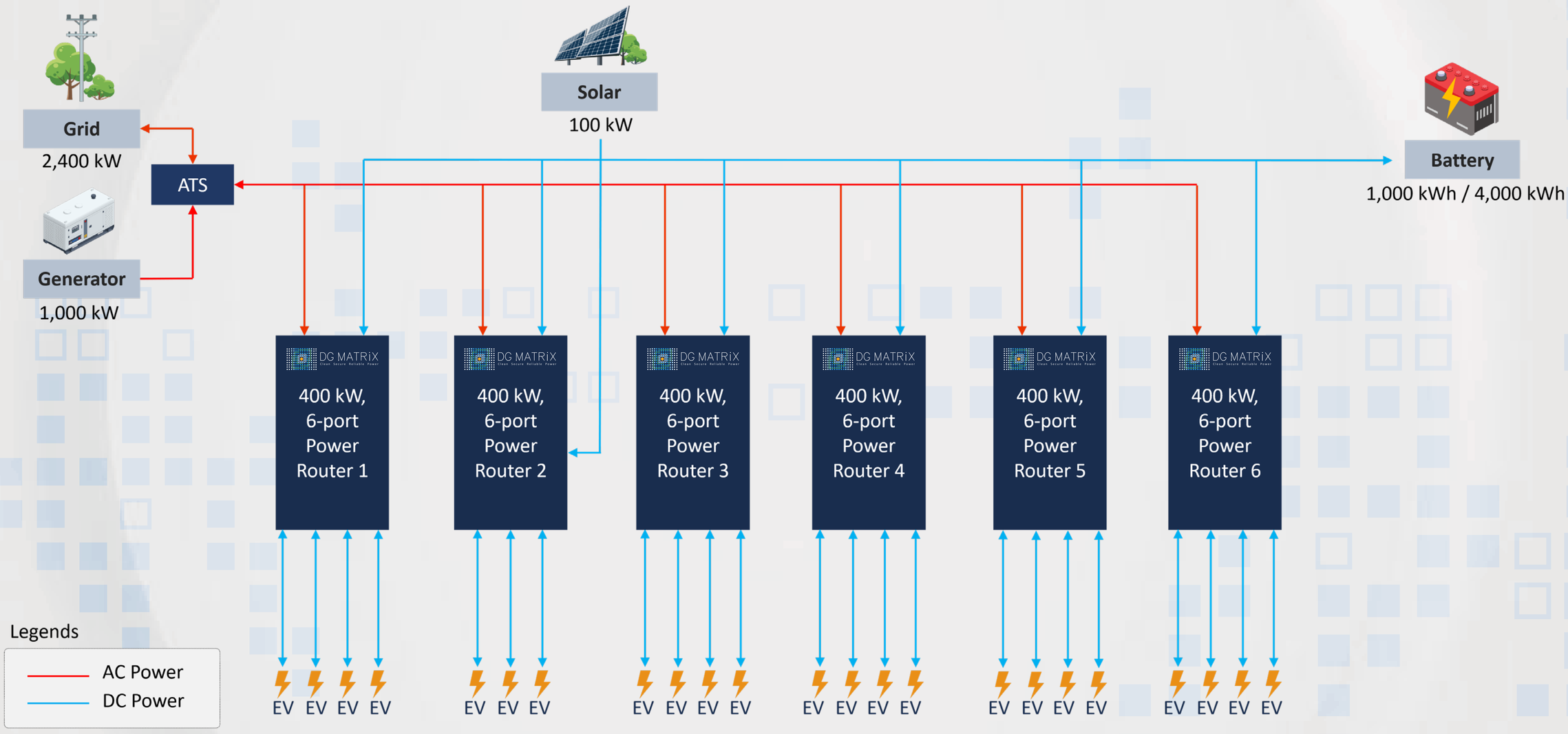
Proposed Solution: The DG Matrix Power Routers

DG Matrix deploys a cutting-edge energy management solution for the site, leveraging its Power Router technology. The facility's energy ecosystem includes:

- **Power Routers:** 23 fast charging stations, each capable of delivering up to 400 kW.
- **Battery Storage:** A 1,000 kW / 4,000 kWh battery system stores excess energy and mitigates peak demand.
- **Solar PV System:** A 100 kW solar array supplies renewable energy directly to the site.
- **Backup Generator:** A 1,000 kW generator ensures resilience during prolonged outages.
- **Grid Interconnection:** A 2,400 kW utility service maintains a steady baseline power supply.



The DG Matrix Power Router provides distinct advantages over legacy systems:

- **Integrated Single-unit Power Router Technology:** Combines power conversion, protection, and energy management into a single, compact system—drastically reducing system footprint, simplifying deployment, and lowering equipment costs while increasing system efficiency to up to **98%**.
- **Dynamic Power Sharing with Ultra-high Granularity:** Balances power distribution among EV chargers and other on-site loads to maximize asset utilization and optimize energy usage.
- **Smart Energy Management Software:** Provides real-time monitoring, predictive analytics, and automated load shifting to reduce peak demand charges and enhance system efficiency.

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Results

CapEx Savings:

- **32%** lower infrastructure costs by consolidating power management hardware and minimizing the need for grid upgrades.
- **35%** reduction in installation costs due to streamlined deployment and fewer components.

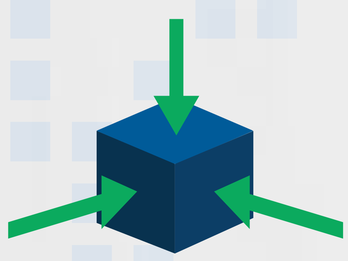
OpEx Savings:

- **39%** reduction in annual energy costs through demand charge mitigation and optimized energy utilization.
- **25%** lower maintenance costs due to a simplified architecture and advanced diagnostics.

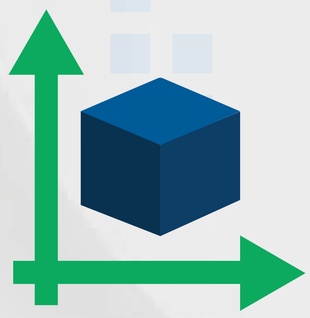
Financial Metrics:

- Payback Period: **4 years,** compared to 7+ years for traditional systems.
- Internal Rate of Return (IRR): **31%** (estimated based on operator data).

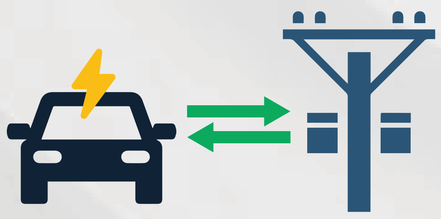
Value-Added Features and Additional Benefits



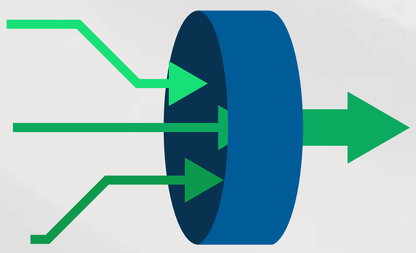
Enhanced Resiliency: Ensures reliability by maintaining operations during outages through a seamless transition to on-site DERs and EV chargers.



Future-Proof Scalability: Enables expansion with additional dispensers and new energy sources without requiring major upgrades.



Grid Support Services: Lowers costs and generates additional revenue by enabling vehicle-to-grid, virtual power plant, and demand response capabilities.



Operational Simplicity: Provides a unified control platform that reduces complexity and streamlines energy management across all sites.

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Conclusion

By deploying the DG Matrix Power Routers, the EV charging operator can create a flagship public fast charging station that sets a new standard for efficiency, sustainability, and scalability. The integrated energy platform can ensure reduced operating costs, enhanced resiliency, and alignment with sustainability goals, positioning the operator as a leader in the evolving EV infrastructure market.

To learn more about how the DG Matrix innovative Power Router solution can revolutionize your energy management, reduce costs, and future-proof your business, contact our team of experts today. We're ready to help you achieve your energy goals and stay ahead in the evolving market.

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